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Medical Errors in Orthopaedics
Results of an AAOS Member Survey

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Background: There has been widespread interest in medical errors since the publication of To Err Is Human: Building a Safer Health System by the Institute of Medicine in 2000. The Patient Safety Committee of the American Academy of Orthopaedic Surgeons has compiled the results of a member survey to identify trends in orthopaedic errors that would help to direct quality assurance efforts.

Methods: Surveys were sent to 5540 Academy fellows, and 917 were returned (a response rate of 16.6%), with 53% (483) reporting an observed medical error in the previous six months.

Results: A general classification of errors showed equipment (29%) and communication (24.7%) errors with the highest frequency. Medication errors (9.7%) and wrong-site surgery (5.6%) represented serious potential patient harm. Two deaths were reported, and both involved narcotic administration errors. By location, 78% of errors occurred in the hospital (54% in the surgery suite and 10% in the patient room or floor). The reporting orthopaedic surgeon was involved in 60% of the errors; a nurse, in 37%; another orthopaedic surgeon, in 19%; other physicians, in 16%; and house staff, in 13%. Wrong-site surgeries involved the wrong side (59%); another wrong site, e.g., the wrong digit on the correct side (23%); the wrong procedure (14%); or the wrong patient (5% of the time). The most frequent anatomic locations were the knee and the fingers and/or hand (35% for each), the foot and/or ankle (15%), followed by the distal end of the femur (10%) and the spine (5%).

Conclusions: Medical errors continue to occur and therefore represent a threat to patient safety. Quality assurance efforts and more refined research can be addressed toward areas with higher error occurrence (equipment and communication) and high risk (medication and wrong-site surgery).

The Patient Safety Committee of the American Academy of Orthopaedic Surgeons (AAOS) has recently completed an analysis of a membership survey regarding medical errors in orthopaedic practice. The results were sought primarily to assist ongoing, day-to-day efforts of the AAOS fellowship to keep patients safe. An additional benefit was to help the Patient Safety Committee and the Academy leadership to identify and prioritize patient safety issues.

The research questions framed for the survey were:

- Will a member survey show occurrence of medical errors in orthopaedic practice?
- Do wrong-site surgeries continue to occur despite the AAOS Sign Your Site program and the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) Universal Protocol?
- Do medical errors in orthopaedics map to recognized error classification systems?
- Can trends that might assist in focusing orthopaedic quality assurance efforts be identified?

The AAOS has been a recognized leader among professional medical societies in proactively confronting issues of medical errors and patient safety1-3. The first major safety initiative undertaken addressed wrong-site surgery. The AAOS Wrong Site Surgery Task Force published its revised report in 19984. The resulting voluntary program was christened the “Sign Your Site” or “SYS” initiative. As a voluntary program, Sign Your Site was not fully embraced by the Academy fellowship5.

The 2000 publication of the Institute of Medicine report entitled To Err Is Human: Building a Safer Health System6 represents the seminal event stimulating widespread interest in...
medical errors in the eyes of the public, news media, politicians, and the medical profession. The Institute of Medicine’s conclusion that between 44,000 and 98,000 patient deaths per year resulted from medical errors in hospitals in the United States was widely publicized. As a result, patient safety has become a noteworthy issue in many quarters.

To date, meaningful data on medical errors have come from regulatory agencies and another surgical subspecialty society. The regulatory agency with the most experience analyzing medical errors is probably the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO). At the time of publication of To Err Is Human, the JCAHO was already looking at some specific errors (i.e., medication errors and wrong-site surgery) by means of its Sentinel Events program. Other sentinel events (e.g., patient death) may have errors identified during the “Root Cause Analysis” required for every sentinel event. In addition to tabulating the incidence of sentinel events, the JCAHO developed a Patient Safety Event Taxonomy for additional subanalysis of medical errors. This taxonomy system has been adopted by the National Quality Forum (NQF). The NQF is a public-private partnered, not-for-profit organization “created to develop and implement a national strategy for health care quality measurement and reporting.” The JCAHO-NQF taxonomy (Fig. 1) thus has wide acceptance and potential application.

The other professional medical society to publish a patient safety membership survey involves ear, nose, and throat surgery under the auspices of the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS). A general classification system of medical errors was developed by those authors after review of the otolaryngology data (Table I). The ear, nose, and throat surgery classification was used for broad analysis of the orthopaedic survey. This allows some general comparisons of errors between physician subspecialty surgical groups.

Drug-related errors have been a particular interest area in the popular press and a focus of quality assurance efforts in hospitals. The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) has developed a classification system of medication errors on the basis of the degree of seriousness and/or harm (the potential for fatal error). There are nine categories (A to I). The potential for harm ranges from A (“Circumstances or events that have the capacity to cause error,” e.g., information on allergies unavailable for an unconscious trauma victim) to I (“An error occurred that may have contributed to or resulted in the patient’s death”). Both direct patient deaths in the AAOS survey were associated with medication errors. It was
Materials and Methods

An orthopaedic medical errors survey was developed by the AAOS Patient Safety Committee with the assistance of the AAOS Department of Research and Consultation from the marketing research firm Axxiom Healthcare Alliance. The orthopaedic survey was based on the ear, nose, and throat surgery instrument previously reported by Shah et al., with minor specialty-specific modifications. The AAOS Department of Research engaged Axxiom Healthcare Alliance to assist in the feasibility and pilot testing from which the orthopaedic surgery-adapted version of the survey was produced. This early critical incident research confirmed the hypothesis or research question that medical errors were occurring in orthopaedics, thus suggesting that a larger survey would be worthwhile and applicable to orthopaedic clinical practice. Responses also indicated that established classification systems, such as the ear, nose, and throat surgery general classification, the JCAHON-QF root cause taxonomy, and the NCC MERP medication error classification, were likely appropriate for mapping the data.

The first phase pilot (twenty-four subjects) was administered by Axxiom staff (to reduce bias) by means of a telephone interview. Subsequently, a focus group was convened at the 2004 AAOS Annual Meeting for a face-to-face description of critical incidents and question feedback (again administered by Axxiom staff).

The pilot group was initially chosen according to age and practice status (resident, member from thirty-five to forty-nine years old, member over fifty years old, or emeritus fellow). The group included representation from different practice settings (academic or private and urban or more rural), although this criterion was not a specific factor for inclusion. Orthopaedic nurses were also part of the critical incident pilot, but it was ultimately decided to survey physicians only (similar to the ear, nose, and throat study). The time frame for error was more open-ended in the pilot as we were primarily interested in the richness of the responses and therefore the reliability of the scripted questions, which ultimately helped to refine the survey. The feedback suggested that patient-safety questions were understandable and answered reliably by all segments of the membership. Axxiom thought that the thirty-five to forty-nine-year age group provided more detailed responses in the open-ended description portion of the questioning. Rich responses were obtained from all groups. No en face differences were noted according to member status, age, or practice situation. Given these circumstances, the limited available funding, and consideration of the fact that the survey research questions were directed to the occurrence and/or classification level rather than to therapeutics or clinical intervention, it was thought that we could distribute the survey according to the standard mailing protocol in place at the AAOS Department of Research without further division, and a formal statistical analysis of internal consistency was not performed.

The survey used the same operational definition of medical error as that in the ear, nose, and throat instrument per Dovey et al. “Anything that has happened anywhere in your practice (office, hospital, operating room, emergency room, etc.) that was not anticipated, should not have happened, and makes you say ‘I don’t want this to happen again.’ It can be small or large, administrative or clinical—anything that you feel could be avoided in the future.”

The definition was printed at the beginning of the survey. The definition of a medical error was followed by six inquiries if an error was reported. These are specifically outlined in the Results section (questions 1 through 6). The response format for these questions was multiple choice (some using “all that apply” so that responses could fall into multiple categories) followed by a write-in space for “other.” The multiple choice options and the responses for each question are outlined in Tables II through VII.

The respondent was then asked to insert a narrative description of the event in a blank space. No patient-specific data were requested.
The survey was sent to a cohort from the AAOS mailing list (5540 of the total membership of approximately 20,000) by the AAOS Department of Research. The members surveyed were identified by the Department of Research according to protocols in place to distribute surveys evenly across the AAOS mailing list (with a view to limit the burden of individual members to respond to frequent requests). The survey was forwarded in August 2005. Responses were accepted until the end of the year. Responses included no patient-specific information. Information was collated by the AAOS Department of Research. Data were mapped primarily by the three classification systems previously specified (ear, nose, and throat surgery general classification; JCAHO-NQF root cause taxonomy system; and NCC MERP classification for drug errors). The responses generally were classified directly, but the research department staff identified some situations for which clinical input was requested to confirm mapping to a classification category. For example, in the NCC MERP analysis of drug errors, categorization was clear if a death had resulted, but, for some descriptions, the research staff wanted clinical input into whether an error fell into the “no harm” or “temporary harm” categories. A classification task force (the Director of the Department of Research, the Chairman of the Patient Safety Committee, and an AAOS past president with specific interest and expertise in patient safety) reviewed the raw data and/or categorization and confirmed the final classification. A modified Delphi consensus methodology was used. Equipment and communications task forces (four-person subcommittees of the Patient Safety Committee) similarly reviewed the data and confirmed the classifications in these subdivisions. Incidents could tally in several subcategories, resulting in variable numerators and denominators. Reporting is thus primarily expressed with use of percentages (in similar fashion and allowing general comparison to the ear, nose, and throat surgery survey).

**TABLE II At What Stage in the Care Cycle Did This Incident Occur?**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>7%</td>
</tr>
<tr>
<td>Preintervention</td>
<td>7%</td>
</tr>
<tr>
<td>Intervention (treatment or surgery)</td>
<td>61%</td>
</tr>
<tr>
<td>Postintervention (follow-up care)</td>
<td>16%</td>
</tr>
<tr>
<td>From tests</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
</tr>
<tr>
<td>Unknown or no response</td>
<td>3%</td>
</tr>
</tbody>
</table>

*Multiple responses were accepted. SA = surgical assistant, and CRNA = certified registered nurse anesthesiologist.*
A number is assigned to the options in each layer of subclassification. Frequency data can be ascertained for each category at the various levels of analysis. A period is placed between the numbers assigned at each level of classification. A wrong-site surgery occurring in the hospital operating room (classification 3.01.01.05) is categorized through the tier of options as follows (Fig. 1):

- Primary node: domain (3)
- Secondary options: setting (3.01)
- Tertiary option: hospital (3.01.01)
- Quaternary option: operating room (3.01.01.05)

Such a system is useful for investigators delving into the more detailed analysis of root cause issues.

Role of Funding
There was no external funding for this study.

Results
Of the 5540 surveys, 917 were returned (a response rate of 16.6%). The response rate in the ear, nose, and throat surgery survey (18.6%) was similar. Of the 917 orthopaedic surgeon respondents, 483 (53%) had noted a medical error in the previous six months.

There were six primary questions in the survey instrument for each reported incident:

1. At what stage in the care cycle did this incident occur? (Table II)
   Treatment or surgery had the highest percentage (61%) followed by postintervention or follow-up care (16%).

2. Where did this incident occur? (Table III)
   The most frequent location was the hospital (78%). The office (8%) and ambulatory care center (7%) were the location of a smaller number of incidents.

3. Who was involved in this incident? (Select all that apply) (Table IV)
   Between the reporting orthopaedic surgeon (60%) and other orthopaedic surgeons (19%), AAOS fellows were involved in almost all of the reported incidents. Nursing staff (37%) were the next most frequent, followed by nonorthopaedic physicians (16%) and interns and residents (13%).

4. How would you classify this event? (Select all that apply) (Table V)
   Communication failure and equipment and/or instrument problems were clearly the high-frequency categories.

5. What was the outcome of the incident? (Table VI)
   Fifty percent of the incidents had no direct patient effect (41% had no adverse event and 9% were a near miss). Temporary morbidity occurred in 29%, permanent morbidity in 14%, and death in 3% of the incidents.

6. Did the incident result in litigation? (Table VII)
   Respondents noted litigation in only 4% of the incidents. Data overview suggested another category of mapping, as incidents involving injury to health-care workers were reported in the survey.

7. To whom did the incident occur or who was the injured person? (Table VIII)
   Patients accounted for the largest portion (65%). A considerable segment of incidents (24%) were general in nature and did not impact directly down to the patient level. For example, a prosthesis of an incorrect size that passed onto the field but was
discovered before implantation would be an error; however, it would be considered as general in nature and not impacting down to the patient or person level. Incidents that directly involved medical providers (e.g., needle sticks) accounted for 6%.

**Comparison of Ear, Nose, and Throat Surgery and Orthopaedic Data (Table I)**

Table I shows the frequency data for ear, nose, and throat surgery and for orthopaedics for all sixteen categories in the ear, nose, and throat surgery classification system. In the ear, nose, and throat surgery survey, the medical errors that occurred with the highest frequency were technical incidents (19.3%) followed by medication (13.7%) and testing (10.4%) incidents. Wrong-site surgery represented 6.1% of the reports. In orthopaedics, the top two categories (equipment at 29% and communication at 24.7%) made up more than half of the incidents (53.7%). Medication errors accounted for 9.7% and wrong-site surgery for 5.6%.

**JCAHO-NQF Taxonomy (Fig. 1, Table IX)**

This classification works like a branching decision tree with each upper level box potentially dividing into several boxes on the next lower level. The primary node (an upper level box) for “impact” reflects the degree of harm to the patient. For the next level subclassification of impact, orthopaedic narratives rarely mentioned psychological issues (0.2%) and were directed mostly to the physical aspects (83.6%). This area of classification has the potential for underreporting, particularly on the psychological side.

Further dividing the physical subclassification into nine additional subcategories in the next level down shows the most frequent subclassification was “no detectable harm” (23.8%), followed by “moderate-temporary harm” (18.2%) and “severe-temporary harm” (11.6%). The worst subcategory of “physical” impact was “death” (2.1%).

In the secondary subclassification of the primary node (upper box) “setting,” the operating room had the overall highest frequency of error (54.2%). Subacute care settings were the next most frequent location (13.5%). The emergency room had 6% of the errors, and interventional radiology had 2.5%.

**NCC MERP Classification of Medication Errors (Table X)**

A detailed breakdown of medication errors into nine classes is outlined in Table X. In addition, there are four subclassifications according to the potential or actual harm level of the error. The least serious category, in which no error occurred at the patient level but events had a capacity for error, comprised 4.3%. An example of this category would be the ordering of an antibiotic to which the patient was allergic (technically, a medical error), but the error was caught before the antibiotic was administered (no effect at the patient level, but the capacity for harm existed). Errors at the patient level that involved no harm were 48.9%. Instances that reached the patient level and caused patient harm constituted 42.5%. The fourth and most serious category of error resulting in or contributing to a patient death was 4.3% (two patients).

**Subanalysis of Equipment, Communication, Medication Errors, and Wrong-Site Surgery**

The general classifications indicated that orthopaedic errors occurred with highest frequency in the categories of equipment (29%) and communication (24.7%). However, the most
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Equipment Errors Subanalysis

Equipment errors (29% of all reported incidents) were initially broken down into three primary subcategories. Instrumentation problems (63.2%) occurred approximately twice as frequently as implant errors (31.6%). A further division of the two high-frequency categories (instrumentation errors and implant errors) was performed.

In the secondary subanalysis of instrumentation errors, technical use errors (29.6%) occurred most often. Examples include excessive tibial resection secondary to an improperly assembled cutting jig. Missing parts (28.6%) was almost as frequent. On the next tier of frequency were sterility problems (16.4%) and intraoperative breakage (14.3%).

Regarding the impact to the patient by equipment errors, surgery was cancelled in 11.6% of the cases, the surgical plan was altered in 16.8%, surgery was prolonged in 12.3%, and reoperation was necessary in 8.4% of the cases. An extended “orthopaedic time out” (checking allergies, antibiotics, records, imaging, and equipment) was estimated to have been potentially able to detect a problem and prevent a medical error in approximately 16.8% of these cases.

Implant Errors Subanalysis

The implant-related error with the highest rate was missing implants (42.9%). Having the wrong implant constituted 28.6% of the incidents. Less common problems were late arrival (12.2%), an implant that broke intraoperatively (6.1%), and the implant that broke preoperatively (2.0%).

Communication Errors Subanalysis

The initial breakdown of communication errors was into five categories by the format of the communication. Incidents could tally to more than one category. There were compounding errors in some incidents. The incidents involved verbal (16.0%), written (29.1%), and dictated comments (0.7%). Errors involved protocols already in place in 31.2% of the cases, and failure to communicate constituted 23.4% of the cases.

The venue of communication errors was the hospital (81.9%), rehabilitation unit or nursing home (4.7%), surgery center (1.6%), and office or clinic (11.8%). The hospital venue was further subdivided into the operating room, including the preoperative holding area (35.5%); the postanesthesia care unit (2.9%); the intensive care unit (1%); the surgical floor (30.7%); the radiology department (9.6%); and the laboratory (5.8%).

The medical personnel involved in communication errors were tallied. More than one provider could be involved per incident. The orthopaedic surgeon was involved in 24.3% of the incidents and other physicians, in 16.5%. Nurses in the operating room (not during an actual case) were involved in 7.1% and circulators, scrub nurses, and/or technicians (during a case), in 15.7%. Floor nurses were associated with 16.4% of the incidents; physician assistants, with 1.4%; office staff, with 10%; and pharmacists, with 3.6%. Industry representatives were involved with 5% of the communication errors.

At the patient level, communication errors resulted in a near miss in 19.4% of the incidents. Errors reaching the patient

### TABLE X Breakdown of Forty-seven Medication Errors by the NCC MERP Classification System∗

<table>
<thead>
<tr>
<th>NCC MERP Class</th>
<th>Description</th>
<th>No. (% of Cases)</th>
<th>Harm Level†</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Circumstances or events that have the capacity to cause error</td>
<td>2 (4)</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>An error occurred but the error did not reach the patient (An “error of omission” does reach the patient)</td>
<td>1 (2)</td>
<td>*</td>
</tr>
<tr>
<td>C</td>
<td>An error occurred that reached the patient but did not cause the patient harm</td>
<td>9 (19)</td>
<td>*</td>
</tr>
<tr>
<td>D</td>
<td>An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm</td>
<td>13 (28)</td>
<td>*</td>
</tr>
<tr>
<td>E</td>
<td>An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention</td>
<td>5 (11)</td>
<td>+</td>
</tr>
<tr>
<td>F</td>
<td>An error occurred that may have contributed to or resulted in permanent patient harm</td>
<td>9 (19)</td>
<td>+</td>
</tr>
<tr>
<td>G</td>
<td>An error occurred that may have contributed to or resulted in hospitalization</td>
<td>2 (4)</td>
<td>+</td>
</tr>
<tr>
<td>H</td>
<td>An error occurred that required intervention necessary to sustain life</td>
<td>4 (9)</td>
<td>+</td>
</tr>
<tr>
<td>I</td>
<td>An error occurred that may have contributed to or resulted in the patient’s death</td>
<td>2 (4)</td>
<td>#</td>
</tr>
</tbody>
</table>

* Nine classes (A through I), ranking from the least potential for patient harm (A) to an error contributing to a patient death (I). † The harm level is broken down into four additional subcategories: 0 = categories where no error occurred but events had a capacity for error, * = error but no harm, + = error with harm to patient, and # = error resulting in patient death.

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level but resulting in no harm were involved in 47.6% of the incidents. An error reached the patient level and caused a negative outcome in 33% of the incidents. The negative impact to patients varied from minor delays of surgery to revision knee arthroplasty (when a wrong-sided prosthesis was implanted).

**Serious Medication Incidents Subanalysis (Table X)**
The last three categories (G, H, and I) of the NCC MERP classification\(^9\) of medication errors involve instances of permanent harm or death. In the AAOS study, eight patients (17%) fell into these categories (two died, four required intervention to sustain life, and two sustained permanent harm). Both deaths occurred on the hospital ward and involved narcotic medications. Two of the patients in the H and I categories were in the operating room. One sustained a cardiac arrest after a high spinal anesthetic, and the other patient sustained a cardiac arrest at the end of a procedure after receiving a final dose of a supposedly epidural anesthetic and the nurse anesthetist had turned off the pulse oximeter alarms.

**Wrong-Site Surgery Subanalysis**
There were twenty-seven incidents of wrong-site surgery. Five of these did not include sufficient detail for type subanalysis. The remaining twenty-two were broken down by type of wrong-site surgery. The majority (59%) involved the wrong side. However, there were also five instances (23%) of other wrong location (e.g., the wrong finger on the correct hand), three wrong procedures (14%), and one wrong patient (5%).

In terms of anatomic location, seven of the twenty-seven did not have specific anatomic descriptions. The remaining twenty incidents were classified by anatomic site. The knee and the fingers and/or hand both accounted for the highest number of occurrences (35% each). The next most frequent anatomic location was the foot and ankle (15%). There were two incidents of a traction pin being placed in the distal end of the femur on the wrong side. However, there were also five instances (23%) of other wrong location (e.g., the wrong finger on the correct hand), three wrong procedures (14%), and one wrong patient (5%).

**Discussion**
Population surveys have limitations. In this survey, responses were received from a relatively low percentage of the target population. In addition, there is a potential for recall bias with an event time frame of several months. These factors limit confidence in the generalizability of population survey results. Thus, we believe that the appropriate level of utility for this study is for trending purposes to help to focus quality assurance efforts and as a motivator for more detailed research.

In this survey of orthopaedic surgeons, the category of equipment-related errors had the highest rate of incidents (29%), perhaps not surprising given our technology-intensive procedures. Communication errors had the second highest rate (24.7%). These two categories constituted 53.7% of the total number of errors. This contrasts with a broader distribution from the ear, nose, and throat surgery survey\(^8\), in which four categories made up 53.3% of the errors (technical errors at surgery comprised 19.3% of the errors; medication, 13.7%; testing, 10.4%; and surgical planning, 9.9%). The impact of equipment-related errors on patients was common, with effects reaching the patient level in 49.1% of the incidents. Fortunately, most consequences were minor, and only 8.4% of the events required a reoperation. Communication errors were the second most frequent error (24.7%). A subanalysis showed the largest proportion (31.2%) occurred when there was a “protocol in place,” such as radiographs not arriving for a scheduled surgical case. The second largest category was “failure to communicate” (23.4%). Some of these occurrences might be addressed by strategies outside normal quality assurance programs. Failure to notify the surgeon that a wrong-sided knee prosthesis was passed onto the operating field may result from a hierarchical, sometimes intimidating, environment. “Crew resource management” as developed in the aviation field\(^17\) could have application to this medical situation\(^18\).

Verbal communication errors constituted 16% of the incidents. The JCAHO 2008 National Patient Safety Goals specify clear read-back on verbal orders\(^3\). Errors resulting from written communication were involved in 29.1% of the incidents. Creating an organizational culture with accurate communication (particularly with medication administration) has been identified as an area requiring nursing, hospital, and/or pharmacy initiatives\(^20-22\).

Orthopaedic surgeons were involved in communication errors 24.3% of the time. The AAOS has already embarked on a communication skills mentoring program in conjunction with the Institute for Healthcare Communication (previously the Bayer Institute for Healthcare Communication)\(^23,24\).

It is disconcerting that wrong-site surgeries continue to occur. The orthopaedic survey was sent out two months after the JCAHO Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery\(^25-27\) became mandatory. JCAHO statistics corroborated an ongoing incidence of wrong-site surgery\(^26,28\). These data led the JCAHO to convene another Wrong Site Surgery Summit\(^29\) on February 23, 2007. The surgery team’s full and precise compliance with the Universal Protocol was identified as the major issue surrounding the persistent occurrence of wrong site surgery\(^25\). Subanalysis found that the leading factor contributing to these incidents was communication problems (>60%)\(^30\).

The types and locations of wrong-site surgery in orthopaedics mirror those in the JCAHO analysis for events in the 2006 calendar year\(^29\). The errors involved the wrong side in 59.1% of the incidents in the present study and 56% in the JCAHO study; other wrong location, such as the wrong digit on the correct hand, in 22.7% and 19%, respectively; the wrong procedure, in 13.6% and 8%; and the wrong patient in 4.5% and 17%. There is clearly a need for a diverse, systems approach to prevent medical errors. One barrier, such as the institution of a “time out” in the operating room, is inadequate. Multiple preventative systems barriers are needed to avoid diverse types of error.

Medication errors are also an ongoing source of concern for orthopaedics\(^29\) and medicine in general. Medication errors represented 9.7% of the orthopaedic error reports. In this survey, both patient deaths attributable directly to an error resulted from medication errors involving narcotic administration on
the hospital ward. A JCAHO 2008 National Patient Safety Goal is to “improve the safety of using medications.” The NCC MERP also has a focus on medication errors. Computerized order-entry systems have been explored as a possible strategy for error prevention, and the AAOS has an Information Statement on Prevention of Medication Errors.

Communicating medical errors to patients and family is controversial. The AAOS published an advisory statement in 2004 indicating that adverse events should be disclosed “directly with a patient/family member in an honest, compassionate manner as soon as possible after an adverse event occurs.” An article in the *American Medical News* reported that several states (California, Georgia, Massachusetts, Texas, and Vermont) have passed legislation “protection of statements or other benevolent gestures expressing sympathy from being admitted as evidence of liability in medical malpractice and other accident cases.”

In Colorado, the Colorado Physicians Insurance Corporation (COPIC), the physician-owned professional liability carrier, has developed a novel program for dealing with adverse events and medical errors. Both the present COPIC Chief Executive Officer, Ted Clarke, MD, and his predecessor, K. Mason Howard, MD, are orthopaedic surgeons. Dr. Howard also coauthored one of the two articles that formed the basis of the Institute of Medicine report *To Err Is Human: Building a Safer Health System*. The COPIC 3R’s Program (Recognize, Respond, Resolve) provides for “open and honest communication with the patient,” includes physician training for disclosing unanticipated outcomes, and provides no-fault compensation for a patient’s out-of-pocket expenses (a limit of $30,000). Patients are not required to sign documents stipulating that they will not file a lawsuit. A summary of this program was published in the *New England Journal of Medicine*. Following implementation, the number of expected lawsuits resulting from adverse events was reduced.

Physician attitudes and experience toward disclosing errors to patients have been surveyed. Patients are not often told of medical errors, particularly those that do not result in harm. The largest barrier identified by physicians in both the United States and Canada was the malpractice environment.

Dr. John Eisenberg, the late Director of the Agency for Healthcare Research and Quality (AHRQ), was a strong advocate for changing the present culture of “finger pointing” (the name, blame, and shame approach) and moving toward a systems-oriented methodology for addressing medical errors. He believed that continuing education was the key to culture modification. Resistance to the adoption of patient safety practices continues, however, even in circumstances in which there is good evidence of effectiveness.

In conclusion, medical errors continue to be a cause of concern. To our knowledge, the AAO-HNS and the AAOS are the only two specialty medical societies to conduct patient safety surveys. The AAOS member survey has allowed an overview of the occurrence of errors within orthopaedics. Equipment errors and communication errors appear to be the most frequently observed types, and medication errors had the most serious consequences for patients. Trends identified in the analysis of error categories can serve as a guide to quality assurance efforts.

The elimination of wrong-site surgery has been a priority of the AAOS and subspecialty societies for more than a decade with the AAOS Sign Your Site initiative and, more recently, the North American Spine Society “Sign, Mark and X-Ray” program. The JCAHO has mandated the Universal Protocol, which includes the three elements of patient identification, surgical site marking, and calling “time out” prior to incision. The latest Wrong Site Surgery Summit, convened by the JCAHO in February 2007, concluded that the Universal Protocol was a well-constructed policy. However, efforts needed to be redoubled to educate physicians, hospitals, and other health-care institutions regarding the underlying principles of the protocol. In addition, specific attention needed to be paid to the details of the protocol by all individuals on the surgical team or wrong-site surgeries would continue to occur.

Leadership has been identified as a key factor in creating a culture of safety in medical practice. In orthopaedics, patient safety continues to be a high priority for the AAOS and members of the AAOS Board of Specialty Societies, such as the North American Spine Society. The American volume of *The Journal of Bone and Joint Surgery*, as the premier respected journal in the orthopaedic specialty, has highlighted the importance of patient safety in its editorial pages and Orthopaedic Forum section, as well as with the publication of peer-reviewed papers.

Data from the AAOS Patient Safety Survey will enhance the ability of orthopaedic surgeons to safely look after patients. Further, the results of the survey serve as an indicator for quality assurance efforts, point to areas of potential additional research, and help to maintain the leadership role of orthopaedic surgery in creating a “culture of safety” in medicine.

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References


13. Gibbs N, Bower A. What insiders know about our health-care system that the rest of us need to learn. Time. 2006 May 1;167:42-8, 51-2.


